REMARKS/ARGUMENTS

Claims 1-40 remain in this application.

In Paragraph 1 of the Examiner's Letter of November 6, 2002 in this application, the Examiner provisionally rejected Claims 1-40 under the doctrine of obviousness-type double patenting. The Examiner states that the Claims in the two applications are not patentably distinct from each other because they both claim "a powerline communication transmitter using pulse position modulated technique, comprises a triac switch in series with a capacitor, a zero crossing detector and a digital control integrated circuit". This is true, but much more than that is disclosed and claimed. That is the environment in which the invention is made. That is what is disclosed in Belcher Patent No. 4,328,482.

The prior application Serial No. 09/656,160 disclosed and claims the concept, and the structure for implementing the concept, of detecting zero crossing and placing a single pulse in the powerline in a zero crossing following the detected zero crossing. It has been determined that the best position to place a detectable pulse is close to but not at zero crossing. The powerline wave shape is very irregular, and thus it is necessary for maximum reliability to place the pulse at a position where it is most reliably detected. The pulse is positioned close to zero crossing in the quietest zone to maximize reliability.

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This application Serial No. 09/879,847 is a continuation-in-part of my prior application Serial No. 09/656,160. The two applications teach inventive concepts which are separately patentably distinct from each other.

This application, Serial No. 09/879,847, in its disclosure and in its amended claims, calls for the concept and structure to produce at least one leading synchronization/reference pulse which is positioned with respect to zero crossing and it calls for positioning all of the following data pulses to be time with relationship to the synchronization/reference pulse. This teaching is absent from Belcher and the other art of record and is absent from the parent application Serial No. 09/656,160.

These two different elements of the design are not insignificant or obvious. It took two years of testing and development of the structure taught by the parent application to find that there was no way to increase the number of bits that can be included in multiple positions over the simpler system described in the parent application. Only one bit pulse can be sent and detected at each zero crossing. It is the position of the bit that provides the numerical data in the communication. The only way to increase the speed of communications is to increase the number of possible bit positions. In order to increase the number of positions, the positions must be spaced much closer together. This is required because the total time frame in which the positions can be located is very limited. It is limited to about 1,000 microseconds and falls close to but not at the zero

crossing point. The noise and interference at the zero crossing point requires that the synchronization/reference pulse and the data pulse be away from those points.

In the parent application there can only be a total of about 4 pulse positions which can be referenced to the zero crossing point but away from the zero crossing point at each powerline cycle. If more data is to be transmitted, the number of positions must be increased. Using the zero crossing point as the only reference source does not permit significant increase in number of pulse positions and consequent reducing the separation of the pulse positions.

The parent application uses only the zero crossing point as the time reference. Investigation has shown that the zero crossing point varies from cycle to cycle by plus or minus 100 microseconds. It is easy to see that it is not possible to reliably detect positions which are closer than 100 microseconds. By using the leading synchronization/reference pulse system of this application, the width of each data position can be as little as 3 microseconds. In order to be very reliable, the position in which each pulse is located must be very accurate and very stable. This cannot be accomplished purely by zero crossing information.

The detection of the correct position is fairly complicated but the fact that each pulse is not a small square wave or a single sine wave, the way it is depicted in the prior art. In reality, each single pulse is actually a series of waves of varying number, length,

magnitude and shape. The detection of the position of this "pulse", which is actually a set of waves, is complicated by the fact that the series of waves overlaps the location of the multiple data position. Using a synchronization/reference pulse overcomes this timing problem.

The reason for reducing the width of the pulse position is to permit more pulse position per half cycle to increase the overall speed or baud rate of the communications. For some applications a low baud rate is satisfactory, but when a higher baud rate is possible, there are more useful applications.

It is thus seen that there is a significant difference between the parent and this CIP application and this difference amounts to an unobvious difference. These two applications are directed to subject matter which is separately patentable.

In his Paragraph 3 the Examiner rejected Claims 1-40 under Section 103 as being obvious when Belcher is considered in view of Torre. A review of the teachings of Belcher shows that he teaches a remote control system which includes sending a single wave pulse down an AC powerline. Sync pulse generator 14 provides pulses which are synchronized with the positive and negative peaks of the AC power (Column 3, lines 57-60). The code generator generates a code such as a particular pulse count (Column 3, lines 61-62). These signals are combined and actuate a triac 18. When actuated, the triac

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permits the discharge of capacitor 20 across the powerlines. The system is set up so that the pulse is impressed on the AC power wave at its peaks, see FIGURES 2 and 6. The code pulses are produced in a predetermined number in accordance with the signal to be sent. (Column 4, lines 31-42). FIGURE 5 illustrates a block diagram of a receiver. The signal is in the form of the number of pulses in the train, each at a peak. The number is counted and the signal resolved therefrom. (Column 5, lines 29-65.) Belcher does send a signal down the powerline. The signal consists of a series of pulses at succeeding voltage peaks with the number in the series unique to a particular switch in a receiver (Column 1, lines 56-59.) Torre has a magnetic surveillance system wherein the first unit emits a short term (1.6 milliseconds) high frequency (60 KHz). The second unit detects anomalies in the field. The second unit is only turned on during the short on-duty cycle of the first unit magnetic transmitter. Each of the first and second units <u>separately</u> detects its on-cycle from a zero crossing detector. Since the first and second units may be connected into two different branches of a three-phase supply, the second unit may be off synchronization by 120° or 240° of a 60 cycle power supply. To make sure that the receiver is turned on at the right time, it is enabled three times during each operating cycle (Column 16, lines 49-62.) The three enablement times are synchronized with the three possible time positions. This compensates for the phase of the powerline voltage. Torre teaches that his basic timing information is directly derived from the zero crossing detectors. He multiplies the number of on-time windows in the receiving circuit so that a receiving window is open at 0°, 120° and 240° with respect to the wave as sensed by the

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zero crossing detector. There are no small adjustments and there are no other adjustments for line signal anomalies.

What Torre teaches is that the transmitter and receiver of Belcher are plugged into different circuits, the receiver can be driven at a higher pulse rate so that it is operative for any normal difference in zero crossing as detected in different phases. This does not make sense for Belcher because he transmits his signal down the line. Thus, Torre does not teach pulse position modulation. He does not teach adjustment of a receiver on the same line for differences due to anomalies in the actual voltage curve.

Going to the amended claims, Claim 1 recites that the transmitter emits a synchronization/reference pulse which is referenced to the zero crossing time followed by one or more data pulses which encode a binary number the value of which is determined by the relative position of the data pulse with respect to the preliminary synchronization/reference pulse. This is totally absent from Belcher and Torre. They both rely purely on the zero crossing signal as the data reference point. Furthermore, Belcher applies his signal pulse at the voltage peak, rather than at a specific time frame before but not at the zero crossing.

Claim 13 recites a transmitter circuit which produces a reference pulse in the powerline which is related to the zero crossing time and the signal source is actuated

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to produce a plurality of subsequent data pulses away from zero crossing and within 1024 microseconds of zero crossing. This is absent from Belcher and Torre.

Claim 14 recites a filter circuit for filtering out power voltages and passing signal pulses where the signal pulses are comprised of one or more synchronization/reference pulses followed by one or more data pulses. The control circuit receives the information and compares the data pulses to the timing of the synchronization/reference pulse to determine at which one of the plurality of signal timing positions the data pulse is in. This structure is absent from Belcher and Torre. There is no comparison in the receiver of either one of them or the timing between a synchronization pulse and the later data pulses. It is this structure which permits accurate timing so that accurate detection of signal pulse positions can be achieved.

Claim 19 also recites the synchronization/reference pulse trigger signal which is referenced to a prior zero crossing so that the pulse is added to the powerline nearer the space from the zero crossing. It goes on to recite that the capacitor thereupon discharges at least one data pulse within one of a plurality of time positions referenced to the synchronization/reference pulse.

Claim 31 again recites the synchronization/reference pulse in the powerline in a quiet zone near zero voltage crossing and this is followed by at least one data pulse which is time referenced to the synchronization/reference pulse. It further

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states that the receiver receives the synchronization/reference pulse within the quiet time near zero voltage and the circuit is structured to receive six subsequent data pulses from the powerline within the quiet zone. Each of these claims recites structure which is novel and unobvious with respect to the art.

The dependent claims recite further novel and unobvious subject matter. Claim 2 recites a memory which is organized to provide a series of signal pulses. Claim 3 recites the triac. Claim 4 recites that the triac charges the capacitor. Claim 5 recites the zero voltage crossing sensor. Claim 6 recites that the digital control circuit emits actuating pulses to the switch to cause one or more data pulses. Claim 7 recites that there are at least 4 signal timing positions prior to zero crossing. Each of these recited structures is not taught by the art. Claim 8 is dependent on Claim 1 which recites the transmitter and controller are the same type of circuit. Claim 9 recites the triac, capacitor and filter circuit. Claim 10 recites a memory programmed to define the signal timing positions prior to and spaced from zero crossing. Claim 11 recites the memory which is programmed to define signal timing positions prior to and spaced from zero crossing. Claim 12 recites the output driver. Claim 15 states that the control circuit is programmed to sense the signal pulses only at predetermined timing positions close to zero crossing. Claim 16 recites there are at least four signal timing positions before but not at zero crossing. Claim 17 recites that the transmitter and receiver are the same, but programmed differently. Claim 18 recites the presence of an automatic gain control of the receiving

system. Claim 20 is dependent on Claim 16 and recites that the control circuit is programmed to turn on the switch to produce a synchronization/reference pulse referenced to zero voltage crossing. Claim 21 is dependent on Claim 19 and recites similar structure. Claim 22 recites at least four temporal positions. Claim 23 recites that the positions are about 32 microseconds apart. Claim 24 recites the zero voltage crossing detector being connected to receiving control circuit and a filter which filters out substantially all signals except the command pulse. Claim 25 recites that the receiving control circuit is programmed to distinguish between different time positions within the time period near to but spaced from zero crossing. Claim 26 states that the control circuit can distinguish between different time periods relative to the position of the reference pulses. Claim 27 recites that the receiving controller is connectable to a powerline and electric load for powering the electric load. Claim 28 is dependent on Claim 21 and recites that the transmitting control circuit is programmed to produce a powerline pulse within one of several time positions near zero voltage crossing. Claim 29 recites that there are at least four possible control positions. Claim 30 recites that the temporal positions are about 32 microseconds apart. Claim 32 recites that the system operates within a quiet time between 500 and 1,000 microseconds away from zero voltage crossing.

Claim 33 is another independent claim in method format which recites the step of discharging a capacitor into a powerline to cause a synchronization/reference pulse

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related to zero crossing and also discharging a capacitor for producing a series of data pulses related to the position of the synchronization/reference pulse. It recites sensing at a receiving controller with respect to the synchronization/reference pulse and the data pulses are located in time and position with respect to the reference pulse.

Claims 34-40 are additional method claims, all dependent or series-dependent on Claim 33, and are believed to recite additional novel and unobvious aspects which are patentable with Claim 33.

This application has been amended and it has been shown how the claims are novel and unobvious with respect to the art. Accordingly, it is respectfully requested that this application be re-examined and allowed.

Respectfully submitted,

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